Influenza Surveillance, Burden and Prevention in Africa

(Or …”why are we here?”)

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Atlanta
Number of respiratory specimens tested for influenza in 15 African countries of ANISE*, 2006-2010

*Angola, Côte D’Ivoire, Democratic Republic of Congo (DRC), Egypt, Ethiopia, Ghana, Kenya, Madagascar, Morocco, Nigeria, Rwanda, South Africa, Tanzania, Uganda and Zambia

Michalove et al JID – submitted
Aggregates of Type and Subtype of Influenza virus positive Specimens by Epidemiological Week in 10 West African countries* May 2009 -April 2010).

*Nzussouo et al  JID in Press
Surveillance in different settings
Figure 3: Number of deaths in children younger than age 5 years and their distribution by cause for the six WHO regions (yearly average for 2000–03). Size of circle represents number of deaths in region. Afr=Africa, Amr=Americas, Emr=Eastern Mediterranean, Eur=Europe, Sear=Southeast Asia, Wpr=Western Pacific.

- **AMR-0-439 million**: 12% Pneumonia, 1% Diarrhoea, 12% Malaria, 44% Others
- **EUR-0-263 million**: 12% Pneumonia, 0% Diarrhoea, 13% Malaria, 44% Others
- **EMR-1-409 million**: 21% Pneumonia, 0% Diarrhoea, 17% Malaria, 43% Others
- **AFR-4-396 million**: 21% Pneumonia, 6% Diarrhoea, 16% Malaria, 26% Others
- **SEAR-3-070 million**: 19% Pneumonia, 1% Diarrhoea, 18% Malaria, 44% Others
- **WPR-1-020 million**: 13% Pneumonia, 0% Diarrhoea, 17% Malaria, 47% Others

R Black et al Lancet 2010; June 2010
Development of Respiratory Mortality Multiplier (RMM)

WHO Mortality Stratum†

*LRTI mortality rate ratio calculated by comparing the LRTI mortality rate in each country with the median LRTI mortality rate of countries with very low child and adult mortality


Dawood et al Lancet submitted
<table>
<thead>
<tr>
<th>WHO Region</th>
<th>All Ages (IQ Range)</th>
<th>0-17 years (IQ Range)</th>
<th>18-64 years (IQ Range)</th>
<th>&gt;64 years (IQ Range)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Africa</td>
<td>66,300 (32,600-161,500)</td>
<td>25,800 (11,000-68,200)</td>
<td>36,000 (19,300-63,000)</td>
<td>4,500 (2,300-12,300)</td>
</tr>
<tr>
<td>America</td>
<td>18,700 (9,800-42,700)</td>
<td>4,200 (1,800-20,900)</td>
<td>11,500 (6,300-20,000)</td>
<td>3,000 (1,700-8,600)</td>
</tr>
<tr>
<td>Eastern Mediterranean</td>
<td>20,000 (9,600-95,100)</td>
<td>6,500 (2,600-22,700)</td>
<td>11,800 (6,200-19,000)</td>
<td>1,700 (800-51,700)</td>
</tr>
<tr>
<td>Europe</td>
<td>17,200 (9,100-38,600)</td>
<td>2,500 (1,000-18,800)</td>
<td>10,400 (5,800-19,000)</td>
<td>4,300 (2,300-12,100)</td>
</tr>
<tr>
<td>Southeast Asia</td>
<td>65,200 (31,400-153,500)</td>
<td>17,900 (7,100-78,600)</td>
<td>40,600 (21,000-64,000)</td>
<td>6,700 (3,300-17,900)</td>
</tr>
<tr>
<td>Western Pacific</td>
<td>33,000 (17,500-72,700)</td>
<td>6,000 (2,600-38,800)</td>
<td>21,600 (11,900-39,000)</td>
<td>5,400 (3,000-15,300)</td>
</tr>
<tr>
<td>Global</td>
<td>220,400 (110,000-564,100)</td>
<td>82,900 (26,100-248,000)</td>
<td>131,900 (70,500-224,000)</td>
<td>25,600 (13,400-117,900)</td>
</tr>
</tbody>
</table>
Status as of: 15 August 2010

Chinese Taipei has reported forty-seven deaths associated with pandemic (H1N1) 2009.

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### Comparing rates of influenza-related all-cause mortality in different settings (per 100,000 person-years)

<table>
<thead>
<tr>
<th>Country</th>
<th>&gt;65 years</th>
<th>All Ages</th>
<th>Reference</th>
</tr>
</thead>
<tbody>
<tr>
<td>United States</td>
<td>133</td>
<td>20</td>
<td>Thompson et al*</td>
</tr>
<tr>
<td>Hong Kong</td>
<td>136</td>
<td>16</td>
<td>Wong et al†</td>
</tr>
<tr>
<td>Singapore</td>
<td>168</td>
<td>15</td>
<td>Chow et al‡</td>
</tr>
<tr>
<td>Australia</td>
<td>116</td>
<td>Not done</td>
<td>Newall AT║</td>
</tr>
<tr>
<td>South Africa</td>
<td>545</td>
<td>Not done</td>
<td>Cohen et al§</td>
</tr>
</tbody>
</table>

* Thompson et al JAMA 2003  
† Wong et al Clin Infect Dis 2004  
‡ Chow et al Emerg Inf Dis 2006  
║ Newall et al Epidem Infect 2008  
§ Cohen et al Clin Infect Dis 2011
Possible risk factors in Africa

• **HIV**

Ope et al. PLoS One, 2011, 6(5)

*Risk factors for Hospitalized Seasonal Influenza in Rural Western Kenya*

- Odds of HIV seropositivity among adults hospitalized for influenza-associated respiratory disease compared to among community matched controls: 3.56 (95%CI =1.26-10.07)

• **Refugee populations**

Ahmed et al BMC Infect Dis 2012 12(1)

*Epidemiology of respiratory viral infections in two long-term refugee camps in Kenya, 2007-2010*

- Rate of influenza-associated SARI
  - 4.8 / 1000 in <5 year olds
  - 11.1 /1000 in <1 year olds
WHO August 2005

“Based on data from industrialized countries, and listed in order of priority”

1. Residents of institutions for elderly people and the disabled.
2. Elderly, non-institutionalized individuals with chronic heart or lung diseases, metabolic or renal disease, or immunodeficiencies.
3. All individuals >6 months of age with any of the conditions listed above.
4. Elderly individuals above a nationally defined age limit, irrespective of other risk factors.
5. Other groups defined on the basis of national data and capacities, such as contacts of high-risk people, pregnant women, health-care workers and others with key functions in society, as well as children 6–23 months.
Different vaccine strategies
Maternal Immunization

VE=29% (all febrile respiratory illness)
VE=62% (Influenza +ve cases)

Figure 3. Episodes of Respiratory Illness with Fever in Infants Whose Mothers Received Influenza Vaccine, as Compared with Control Subjects. Data were recorded from September 2004 to November 2005 for all ages in each vaccine group.
Different vaccine type
Adjuvanted and LAIV

- Adjuvanted trivalent inactivated influenza vaccine
  - Overall VE=79-92%
    compared to 40-45% for nonadjuvanted vaccine*
  - Good effectiveness in young children <2 years

- LAIV
  - Better duration and heterosubtypic immune response

Vesikari et al NEJM, 2011
65% vs 89%
34% vs 61%
25% vs 46%

Ambrose et al.
Pediatr Infect Dis J, 2010
Bringing it together - ANISE

Welcome to ANISE

Africa Influenza Scientific Symposium, 7-9 December, 2009

The Africa Influenza Scientific Symposium took place in Accra, Accra, on 7 December, 2009. It was the second of the biennial African Influenza Scientific Symposia, which is a joint initiative of the World Health Organization (WHO) and the African Union (AU), organized by the Africa Centers for Disease Control and Prevention (Africa CDC) and funded by the US Department of Defense's Global Emerging Infections Surveillance Program (GEISP).

The symposium has highlighted the full range of influenza surveillance and response that has been conducted across the region, including vaccine trials, surveillance, and response. It has also enabled the sharing of knowledge and best practices among stakeholders, including government officials, public health professionals, and researchers. The symposium aimed to strengthen collaboration and improve the capacity of African countries to respond to influenza outbreaks and pandemics.
Being serious about pandemic influenza

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Being serious about seasonal influenza
Vaccine Revolt, Rio de Janeiro, 1904